

REMARKS

Claims 1-20 are pending in the application. Claims 15-20 are withdrawn from consideration. Claims 1, 7, 8, 10, and 14 have been amended. Claims 15-20 have been cancelled. Claims 21-24 have been added. Support for new claim 21 may be found in the specification at page 9, lines 15-19. Support for new claim 22 may be found in the specification at page 14. Support for new claims 23-24 may be found throughout the specification, including FIGS. 2A-2J.

The specification has been amended to clear up an informality on page 8 and to correct the mistaken reference to values for the subscript x in the precursor to the silicon carbide. Applicants submit that no new matter has been added.

Claim Rejections Under 35 U.S.C. § 112

Claims 8, 10, and 14 were rejected under 35 U.S.C. 112, first paragraph and 35 U.S.C. 112, second paragraph. Specifically, the examiner indicated that the claims were indefinite in the recitation that the carbide layer is formed by injecting an $\text{SiH}_x(\text{CH}_3)_y$ gas, where x is chosen in the range of 1 to 4, and $x+y=4$. Applicants have amended claims 8, 10, and 14 to recite that “x” is chosen in the range of 0 to 3. Support for the amendments to claims 8, 10, and 14 may be found in the specification at page 8, lines 14-18. Applicants respectfully request that the examiner withdraw the rejections under 35 U.S.C.112, first and second paragraphs.

Claim Objections

The examiner objected to claims 7, indicating that the reference to the dielectric layer was unclear. Applicants have amended the claim to clarify the reference and note that the examiner’s assumption was correct, i.e., there is no third low-k dielectric layer. Applicants respectfully request that the examiner withdraw the objections to claim 7.

Claim Rejections Under 35 U.S.C. §103

Claims 1-3 and 5 were rejected under 35 USC 103(a) as being unpatentable over Chung, Wei-Ming (US 2002/0106895 A1) in view of Tsai, (US 2003/0077897 A1) and Sundrarajan et al. (US 2002/0027286 A1). The rejections are respectfully traversed.

The examiner indicated on page 3 of the office action that Chung's teachings include depositing a nitrogen-free second barrier layer 504 on top of the first barrier layer. Applicants respectfully disagree. Layer 504 in Chung is described as merely an etch stop layer without further detail (paragraph 23). As illustrated in FIG 5B, the etch stop layer functions to stop the etching of the trench 508. Moreover, Chung, either alone or in combination with the other art of record, fails to teach or suggest that the nitrogen free second barrier layer is formed directly on top of the first barrier layer, as required by amended claim 1. Instead, Chung teaches that the etch stop layer 504 is formed directly on the inter-metal dielectric layer 505 (See FIG. 5B).

In view of the foregoing discussion, the rejection of claim 1 over the art of record is believed overcome. Applicants gratefully acknowledge the indication that claims 7, 9, and 11-13 contain allowable subject matter and would be allowable if rewritten in independent form. However, in view of the foregoing discussion, these claims are believed to be allowable in their present condition without amendment.

Claims 2-14 and 21-22 depend from claim 1 and are submitted to be allowable for at least their dependencies from an allowable claim. Moreover, the dependent claims recite additional limitations, and are therefore allowable for these reasons as well. Further discussion of these distinctions is believed unnecessary in light of the distinctions discussed above relative to the independent claims.

Claim 23 is a new independent claim which is submitted to be allowable for at least similar reasons as discussed above with respect to claim 1. That is, neither Chung nor any other of the art of record, either alone or in combination, teaches or suggests depositing a first barrier layer containing silicon carbide and nitrogen on an interconnect and depositing a nitrogen-free second barrier layer directly on the first barrier layer. Claim 24 is a dependant claim, submitted to be allowable at least due to

its dependency from an allowable independent claim. Applicants respectfully request that the Examiner provide a notice of allowance for the pending claims.

Conclusion

In view of the foregoing, Applicants believe that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below. No fees are believed due in connection with the filing of this paper. If any fees are due over and above the fees provided with the amendment, such fees may be charged to deposit account No. 12-2252 (client docket 01-206).

Respectfully submitted,
BEYER WEAVER & THOMAS, LLP

A handwritten signature in black ink, appearing to read "Russell N. Swerdon", is written over the printed name.

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